The Hartford Working Group
Hartford, Illinois

CSM Investigation Work Plan

The Hartford Area Hydrocarbon Plume Site

Hartford, Illinois

ENSR Corporation
December 2004
Document Number 01005-093-351

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December 10, 2004

Mr. Steve Faryan
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Mr. Kevin Turner
USEPA Region V
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8588 Route 148
Marion, IL 62959

Subject: The Hartford Area Hydrocarbon Plume Site / Hartford, Illinois
CSM Investigation Work Plan

Dear Messrs. Faryan and Turner:

ENSR International, on behalf of the Hartford Working Group (HWG), is submitting this Work Plan as a follow-up to the Vapor Migration Assessment Report submitted to the U.S. EPA in October 2004. This work plan supports further development of the Conceptual Site Model for the Site and includes field investigations that are planned to begin on December 27, 2004. ENSR and the HWG appreciate your timely review of this work plan.

Please contact me at (630) 836-1700 with any questions.

Sincerely,

Ralph C. Feeney
Program Manager

enclosure: *CSM Investigation Work Plan, December 2004, 01005-093-351*

cc: Hartford Working Group
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CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This work plan has been prepared by ENSR Corporation, on behalf of the Hartford Working Group (HWG), to address additional soil vapor investigation for the Hartford Area Hydrocarbon Plume Site (Site). This work plan is designed as a follow up to the Vapor Migration Pathway Assessment (VMPA) Report that was submitted to the U.S. EPA in October 2004. This work plan was prepared as a joint effort by the following companies: Atlantic Richfield; The Premcor Refining Group Inc.; and Shell Oil Products U.S. Representatives of these companies have organized to form the HWG.

The VMPA, along with other studies in the Hartford area, contributed significant information towards the development of the conceptual site model (CSM) for the Site. The CSM integrates technical information from many sources to aid in understanding potential risks to human health and the environment. It guides the identification of additional data needed to make decisions regarding those risks. The CSM for the Site can be described as having the following four components.

- A GIS database which serves as a repository for data collected for the Site as well as a tool for visually displaying the data.
- A detailed collection of geologic profiles for the site that display subsurface analytical data.
- A set of home vapor intrusion scenarios that illustrate the likely vapor exposure pathways in different areas of the Village.
- An on-going review of meteorological data to identify potential environmental factors that may influence vapor migration and intrusion events.

The work described in this work plan augments the CSM in the following three areas.

- Provides an overall increase in the density of data points within the Site boundaries.
- Further assesses potential impacts to the Site from adjacent off-site source areas.
- Provides a focused assessment of shallow sources that have been identified within the Site boundaries.

Finally, an important schedule driver for implementing this work plan is the startup of the upgraded soil vapor extraction (SVE) system by Clayton Group services, Inc. in February 2005. Completing the soil vapor sample collection portion of this work before February 1, 2005 will provide a baseline set of soil vapor data prior startup of the SVE system.

2.0 INVESTIGATION APPROACH

The following sections summarize the investigation approach outlined in this work plan.

2.1 Shallow Passive Soil Vapor Survey

Shallow passive soil vapor surveys will be conducted to better define the vapor migration pathway in areas around identified shallow sources and for determining potential locations for additional vapor pathway assessment via passive or active sampling. The areas identified for passive soil vapor survey are on the Community Center property along Rand Avenue (Area 1), and along North Olive Street between East Elm and East Forest (Area 2), as shown on Figure 2-1. Both Gore-Sorber® and EmFlux™ passive soil vapor sampling devices will be installed for this purpose using direct-push at depths and for periods of time recommended by the manufacturer. The samplers will be spaced at approximately 50-foot intervals within the defined areas. Results from the passive samplers will be compared to samples collected from adjacent vapor monitoring points (VMPs) for validation purposes. Soil headspace field screening will also be conducted using a photoionization detector (PID) and flame-ionization detector (FID) for comparison to the passive sampler results.

It is currently uncertain whether either of the passive samplers will provide meaningful data. Following the passive soil vapor survey, a decision will be made on whether or not the passive samplers will be effective for additional site characterization. If the soil vapor surveys in these areas prove useful to better understanding and defining the shallow soil vapor distribution, then they may be used in other areas of the Village and incorporated into the work described in the following section.

2.2 Shallow Soil Investigation

A shallow soil investigation will be conducted in an attempt to better understand the nature and extent of shallow petroleum sources and their potential contribution to vapor intrusion. In addition, the soil investigation will be used to identify vapor migration pathways requiring additional assessment. The targeted areas for shallow soil investigation are within Village of Hartford right-of-way areas shown on Figure 2-1 (Areas 3 thru 7) and are described as follows.

- Northwest and northeast corners of the Site and area along North Olive Street between East Elm and East Forest where shallow sources have been identified by previous investigations, as shown on Figure 2-2 (Clayton, April 2004).
- Reported former gasoline station located at 701 North Delmar Avenue.
- Suspected location of a former gasoline station at 300 North Delmar Avenue.

A Geoprobe™ or equivalent will be used to collect continuous soil samples via direct push to a depth of 15 feet within the areas shown on Figure 2-1. Soil sampling will start near identified or suspected

sources and extend outward from these locations depending on access limitations. Soil borings will be spaced at approximately 25- to 100-foot intervals and conducted by a field geologist in accordance with the decision tree illustrated in Figure 2-3. Decisions regarding boring locations will be based on visual field observations and soil headspace screening using a PID/FID. Soil samples will be collected by the field geologist for purposes of delineating sources and submitted to a laboratory for BTEX and MTBE analysis according to U.S. EPA Method 5035/8260. Soil headspace screening and/or soil sample analytical results will be used to determine potential locations to identify vapor migration pathways requiring additional assessment via passive or active soil vapor sampling.

Shallow passive soil vapor surveys, as described in Section 2.1, may also be conducted at borings installed for the shallow source soil investigation. Therefore, completion of the shallow source investigation will be sequenced to occur following receipt and evaluation of the passive soil survey data from the test areas described in Section 2.1. Locations for passive sampling in Areas 3 through 7 will be selected by the field geologist to cover a broad range of anticipated soil vapor conditions based on field screening results. Borings will be backfilled with bentonite to the appropriate depth as necessary for installation of the passive samplers.

2.3 Active Soil Vapor Monitoring Port Installation

Active soil vapor monitoring points (VMPs) will be installed at locations (see Figure 2-1) where data gaps in the vapor migration pathway have been identified. Detailed rational for selecting these locations and their proposed depths are provided in Table 2-1. The data gaps have been generally classified as:

- Further delineation of the soil vapor plume in the buffer zone.
- Further soil vapor investigation in areas where the Main Sand is relatively shallow.
- Investigation of potential soil vapor impacts to the Site from shallow sources along the North Olive Street pipeline corridor.
- Further definition of the soil vapor plume along the eastern Site boundary.
- Investigation of potential impacts to the Site from sources along the Elm Street pipeline corridor.
- Investigation of potential impacts to the Site from sources northeast of Site boundary, including installation of VMPs at some off-site locations.
- Investigation of potential impacts to the Site from potential sources north of Rand Avenue, including installation of some VMPs at some off-site locations.
- Further definition of the soil vapor plume west of the Site along Old Saint Louis Road between West Cherry and West Date.

Soil samples will be collected by the field geologist and submitted to a laboratory for BTEX and MTBE analysis by U.S. EPA Method 5035/8260. Two soil samples for laboratory analysis will be selected from each boring based on soil headspace screening results using a PID/FID. Soil samples will also be collected and submitted to a laboratory for geotechnical analyses, including grain-size, porosity, moisture content, and bulk density.

At this time, the HWG is not proposing to step-out from these proposed VMP locations based on field observations during installation. This is primarily due to the following facts:

- Physical access to areas further north of the Site is limited by the presence of Route 3 and ConocoPhillips property to the northwest; Casey's General Store and Hartford Wood River Terminal properties to the north; and the BP/Amoco property to the north and northeast.
- Investigations by HWG companies are being planned that will include installation of additional VMPs to the northeast and east of the Site, with the data being shared with the HWG.
- The nature and extent of the soil vapor plume around the southwestern and southern boundary of the residual free-phase plume is essentially delineated and is being augmented with some additional VMPs installed at selected locations to improve data density.

Active soil vapor sampling of the VMPs will be conducted in January 2005. This will include sampling of new and existing VMPs and potentially monitoring points (MPs) previously installed by Clayton Group Services, Inc. around the new SVE wells. The objective of this sampling is to establish a baseline of soil vapor concentrations prior to start-up of the upgraded SVE system (anticipated in February 2005) and to assess whether additional characterization is required. Soil vapor sampling locations will be determined at a later date as additional data is collected.

2.4 Passive Sewer Vapor Sampling

Passive sewer vapor sampling will be conducted in Village of Hartford sanitary sewer manways in two areas. The first area includes all manways located north of the Cherry Street, including manways potentially located north of Rand Avenue. The second area is along North Olive Street between East Elm and East Maple and extending west along East Forest and East Watkins to manways on North Market Street. The objective is to collect sewer vapor data at the same time the shallow passive soil vapor sampling described in Section 2.1 is conducted.

The passive samplers will be hung in the sewer manways. They will remain in place for a period of two weeks, after which they will be retrieved and replaced with a new sampler that will be installed for another two weeks. Upon retrieval, the samplers will be shipped to a laboratory for analysis. This will continue through April 2004, at which time a decision to continue with this sampling will be made based on the analytical results.

2.5 Indoor/Outdoor Air Sampling

In conjunction with the active soil vapor sampling described in Section 2.3, ENSR will also contact residents and schedule indoor air sampling. The objective is to collect indoor air samples at the same time soil vapor samples are collected. The residents that will be contacted for participation in the indoor air sampling event will be those where ENSR has previously conducted indoor air sampling and are located in areas where the site conceptual model indicates increased risk of vapor intrusion from shallow vapor concentrations.

2.6 Monitoring Program

A monitoring program will be developed utilizing the soil vapor monitoring network installed within the Village of Hartford. The overall objective of the program will be to track temporal changes in subsurface vapor conditions during different times throughout 2005. Components of the monitoring program will include tracking of weather conditions and on-going correlation with observations of vapor intrusion within the Village; quarterly soil vapor and indoor air sampling at selected locations throughout the Village; monthly soil vapor and indoor air sampling at a subset of homes during the spring of 2005; weekly sampling of soil gas at a few selected VMPs in areas where the vapor migration pathway may potentially be complete; and continuous soil vapor pressure monitoring and comparison of soil vapor pressures to meteorological data that is collected. Further details will be provided at a later date.

3.0 SCHEDULE AND REPORTING

Figure 3-1 presents an anticipated schedule for completion of the field activities described in this work plan. The actual start date for work activities will be dependent on weather conditions and the ability to obtain clearances to conduct borings in areas congested with numerous buried utility lines and pipelines. Therefore, it is also contingent upon obtaining approval for completing borings near pipelines from the respective companies. The actual length of time to complete the work will be dependent not only on weather conditions but also on the findings in the field.

The data collected from the activities proposed in this work plan will be evaluated and presented in a report that will be submitted to the Agencies 60 days following completion of the field work described herein. This current schedule anticipates this report will be submitted on May 10, 2005.

4.0 REFERENCES

Clayton Group Services, April 2004. FPH CPT/ROST™ Subsurface Investigation Report and FPH Monitoring Well and Soil Sampling Plan for the Village of Hartford, Illinois. Prepared for the Hartford Working Group. Clayton Project No. 15-03095.14.003.

Clayton Group Services, October 2004. Free-Phase Hydrocarbon Investigation Report. Prepared for the Hartford Working Group. Clayton Project No. 15-03095-14.006.

ENSR Corporation, May 2004. DRAFT - Vapor Mitigation System Pilot Test Report. Prepared for the Hartford Working Group. ENSR Document No. 01005-093-210.

ENSR Corporation, June 2004a. DRAFT Initial Vapor Migration Pathway Assessment Report. Prepared for the Hartford Working Group. ENSR Document No. 01005-093-350.

ENSR Corporation, July 2004. Health and Safety Plan for the Hartford Area Hydrocarbon Plume Site. Prepared for the Hartford Working Group. ENSR Document No. 01005-093-300.

ENSR Corporation, September 2004. Design Plan for Vapor Intrusion Mitigation at the Hartford Community Center. Prepared for the Hartford Working Group. ENSR Document No. 01005-093-400.

ENSR Corporation, October 2004. Vapor Migration Pathway Assessment Report. Prepared for the Hartford Working Group. ENSR Document No. 01005-093-350b.

U.S. Environmental Protection Agency, November 29, 2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soild (Subsurface Vapor Intrusion Guidance). Docket ID No. RCRA 2002-0033.

TABLE 2-1

Summary of Proposed Soil Vapor Monitoring Point Locations

Proposed VMP		Anticipated Installation Depths/Stratum	Rational/Notes
VMP-27	D	1 ft into Rand Stratum	Confirm depth of Rand Stratum; adjacent to VMP-27S,M
VMP-28	D	1 ft into Rand Stratum	Confirm depth of Rand Stratum; adjacent to VMP-28S,M
VMP-45	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with presence of dissolved BTEX in groundwater samples from monitoring wells HMW-49C/D; evaluate potential off-site sources north of Rand Ave.; evaluate extent of vapor plume to the north; Rand Stratum not present; EPA Sand is first saturated stratum; Main Sand confined.
	S	1 ft into North Olive Stratum	
	M	Unsaturated permeable unit b/w NO and EPA	
	D	1 ft into EPA Stratum (if unsaturated)	
VMP-46	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with presence of dissolved BTEX in groundwater samples from monitoring wells HMW-49C/D; evaluate potential off-site sources north of Rand Ave.; evaluate extent of vapor plume to the north; Rand Stratum not present; EPA Sand is first saturated stratum; Main Sand confined.
	S	1 ft into North Olive Stratum	
	M	Unsaturated permeable unit b/w NO and EPA	
	D	1 ft into EPA Stratum (if unsaturated)	
VMP-47	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with presence of dissolved BTEX in groundwater samples from monitoring well HMW-38C; evaluate potential off-site sources north of Rand Ave. that may affect Community Center; evaluate extent of vapor plume to the northwest; Rand may not be present; Main Sand may be confined.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand (if unsaturated)	
VMP-48	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with presence of free-product in groundwater at monitoring well HMW-46C; evaluate potential off-site sources north of Rand Ave. that may affect Community Center; evaluate extent of vapor plume to the north.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into EPA Stratum/Main Sand (if unsaturated)	
VMP-49	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with potential off-site sources northeast of site boundary; evaluate extent of vapor plume north of site boundary.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum/EPA Stratum	
	D	1 ft into Main Sand (if unsaturated)	
VMP-50	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with potential off-site sources northeast of site boundary and with shallow residual free-phase hydrocarbon (FPH) impacts (4-10 ft) in this area; evaluate extent of vapor plume to the northeast; Main Sand is saturated.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into EPA Stratum/Main Sand (if unsaturated)	
VMP-51	VS	5 ft into silty clay overburden	Evaluate potential vapors associated with off-site sources northeast of site boundary; evaluate extent of vapor plume northeast of site boundary.
	S	1 ft into Rand Stratum	
	M	1 ft into EPA Stratum	
	D	1 ft into Main Sand (if unsaturated)	
VMP-52	VS	5 ft into silty clay overburden	Evaluate extent of vapors west of VMP-44D (benzene detected at 12,000 ppbv). Groundwater in HMW-39C is below Class I Groundwater Quality Standards for BTEX.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand (if unsaturated)	
VMP-53	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potenital sources along and east of N.Olive St. and along east site boundary.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into EPA Stratum/Main Sand (if unsaturated)	
VMP-54	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along and east of N.Olive St. and east site boundary.
	S	1 ft into Rand Stratum	
	M	1 ft into EPA Stratum	
	D	1 ft into Main Sand (if unsaturated)	
VMP-55	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from sources along and east of N.Olive St. and along east site boundary; evaluate vapors between VP-4S,M,D and SSDS pilot test home.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into EPA Stratum/Main Sand (if unsaturated)	
VMP-56	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potenital sources along and east of N.Olive St. and along east site boundary.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand (if unsaturated)	
VMP-57	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along W. Elm St.; better define vapor plume in buffer zone area; confirm depth of Main Sand, which is relatively shallow here; Rand Stratum not present.
	S	1 ft into North Olive Stratum	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	

TABLE 2-1

Summary of Proposed Soil Vapor Monitoring Point Locations

Proposed VMP		Anticipated Installation Depths/Stratum	Rational/Notes
VMP-58	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along W. Elm St. and shallow (10 - 20 ft) residual FPH impact; confirm depth of Main Sand.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-59	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along E. Elm St. and shallow (10 - 20 ft) residual FPH impact; confirm depth of Main Sand.
	S	2 ft into Rand Stratum	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand	
VMP-60	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along E. Elm St. and shallow (10 - 20 ft) residual FPH impact; confirm depth of Main Sand.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-61	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along E. Elm St. and N. Olive St.; confirm depth of Main Sand where it appears to be shallowest on-site and shallow (10 - 20 ft) residual FPH is present; approx. 200 ft west of HROST-40.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand	
VMP-62	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along N. Olive St.; approx. 50 ft north of HROST-40, where very shallow (4 - 10 ft) residual FPH impact present.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand	
VMP-63	VS	5 ft into silty clay overburden	Improve data density within buffer zone and install a vapor monitoring point on W. Forest.
	S	1 ft into North Olive Stratum	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand	
VMP-64	VS	5 ft into silty clay overburden	Improve data density and confirm depth of Main Sand. Evaluate potential vapors from dissolved BTEX detected in groundwater samples from HMW-41B (benzene detected at 3.29 mg/L).
	S	1 ft into North Olive Stratum (if present)	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand	
VMP-65	VS	5 ft into silty clay overburden	Improve data density and confirm depth of Main Sand in area where Main Sand is relatively shallow.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-66	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along and east of N.Olive St. and along east site boundary; location is approximately 50 ft south/southwest of VMP-15 and approximately 100 ft south of HROST-40 where very shallow (4 - 10 ft) residual FPH impact present.
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand	
VMP-67	VS	5 ft into silty clay overburden	Evaluate soil and soil vapors from potential sources along and east of N.Olive St. and along east site boundary; location is approximately 50 ft south/southwest of VMP-65 (100 ft south/southwest of VMP-15 and 150 south of HROST-40).
	S	1 ft into North Olive Stratum	
	M	1 ft into Rand Stratum	
	D	1 ft into Main Sand	
VMP-68	VS	5 ft into silty clay overburden	Improve data density and confirm depth of Main Sand in area where Main Sand is relatively shallow.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-69	VS	5 ft into silty clay overburden	Improve data density and confirm depth of Main Sand in area where Main Sand is relatively shallow.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-70	VS	5 ft into silty clay overburden	Improve data density within buffer zone and install a vapor monitoring point on W. Watkins.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	

TABLE 2-1

Summary of Proposed Soil Vapor Monitoring Point Locations

Proposed VMP		Anticipated Installation Depths/Stratum	Rational/Notes
VMP-71	VS	5 ft into silty clay overburden	Improve data density and confirm depth of Main Sand in area where Main Sand is relatively shallow.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-72	VS	5 ft into silty clay overburden	Evaluate utility impacts and confirm depth of Main Sand on E. Watkins in area where Main Sand is relatively shallow..
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-73	VS	5 ft into silty clay overburden	Evaluate buffer zone area west of VMP-42, where benzene was detected in shallow overburden at 620 ppbv and the Main Sand at 740 ppbv; improve data density in buffer zone.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-74	VS	5 ft into silty clay overburden	Evaluate buffer zone area east of VMP-42, where benzene was detected in shallow overburden at 620 ppbv and the Main Sand at 740 ppbv; improve data density in buffer zone and along W. Maple.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-75	VS	5 ft into silty clay overburden	Evaluate buffer zone area southwest of VMP-42, where benzene was detected in shallow overburden at 620 ppbv and the Main Sand at 740 ppbv; location is at Village of Hartford public library; provide data point between VMP-42 and Village water supply wells.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-76	VS	5 ft into silty clay overburden	Evaluate buffer zone area south of MP-65, where benzene was detected in shallow overburden at 1.6 ppbv in the shallow overburden and 270 ppbv in the Main Sand; in alley west of railroad tracks.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-77	VS	5 ft into silty clay overburden	Evaluate buffer zone area south of MP-65, where benzene was detected in shallow overburden at 1.6 ppbv in the shallow overburden and 270 ppbv in the Main Sand; next to HMW-28 on S. Market St.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	
VMP-78	VS	5 ft into silty clay overburden	Improve data density in southeast area of buffer zone.
	S	1 ft into any permeable unit above Main Sand	
	M	1 ft into Main Sand	
	D	10 ft into Main Sand (above water table)	

AREA 1

AREA 2

AREA 3

AREA 4

AREA 5

AREA 6

AREA 7

INTERPRETED EXTENT OF RESIDUAL FREE- PHASE HYDROCARBON

LEGEND:

- CPT/ROST™ INVESTIGATION LOCATION NO APPARENT PETROLEUM HYDROCARBON (BLACK)
- CPT/ROST™ INVESTIGATION LOCATION BLUE ROST RESPONSE
- CPT/ROST™ INVESTIGATION LOCATION GREEN ROST RESPONSE
- CPT/ROST™ INVESTIGATION LOCATION YELLOW ROST RESPONSE
- SENTINEL MONITORING WELLS
- EXISTING MONITORING WELL (HB, HMW, P, SP, RB)
- RECOVERY WELL (RW)
- PRODUCTION WELL (P)
- VAPOR CONTROL BORING (VCB)/ SOIL VAPOR EXTRACTION WELL (HSVE)
- PUBLIC WATER SUPPLY WELL (WSW)
- ENSR CORPORATION EXISTING PERMANENT SOIL VAPOR SAMPLING POINTS (VP, VMP)

VS/S/M/D VERY SHALLOW/SHALLOW/MEDIUM/DEEP

- CLAYTON GROUP SERVICES MONITORING PROBES (MP)

A/B/C/D VERY SHALLOW/SHALLOW/MEDIUM/DEEP

- PASSIVE MONITORING POINT (PMP) * DESIGNATES ABANDONED MONITORING POINT LOCATION
- PETROLEUM PIPELINE CORRIDORS (UNDERGROUND)
- INDUSTRIAL SEWER CORRIDOR (UNDERGROUND)
- NATURAL GAS PIPELINE CORRIDOR (UNDERGROUND)

VMP-47 PROPOSED NEW VAPOR MONITORING POINT LOCATION (VMP)

VMP-79 PROPOSED CONTINGENT NEW VAPOR MONITORING POINT LOCATION (VMP)

- PROPOSED SHALLOW-SOURCE SOIL INVESTIGATION AREAS
- PROPOSED PASSIVE SHALLOW SOIL VAPOR INVESTIGATION AREAS

DRAFT WORK IN PROGRESS

* ADAPTED FROM CLAYTON GROUP SERVICES

SCALE IN FEET

0 100 200 400

DRAWN BY: JG/PE	**PROPOSED INVESTIGATION LOCATIONS THE HARTFORD AREA HYDROCARBON PLUME SITE THE HARTFORD WORKING GROUP HARTFORD, IL**
CHECK BY: DS	
DATE: 12/10/04	
REVISED:	
PROJECT NO.: 01005-093-350	

FIGURE 2-1

ENSR® INTERNATIONAL

CONSULTING • ENGINEERING • REMEDIATION

U:\Cad_Drive\01000-01999\1005\093\11005-093_Proposed Vapor Monitoring Point Locations_04_11.dwg

MITIGATION MEASURES OFFER AREA

4–10 FT. BGS

10–20 FT. BGS

20–25 FT. BGS

25–30 FT. BGS

30+ FT. BGS

BGS = BELOW GROUND SURFACE

HROST-62 28
HROST-61 30
HROST-2 10
HROST-3 30
HROST-4 7
HROST-79 19
HROST-5 20
HROST-6 4
HROST-7 12
HROST-8 28
HROST-10 5
HROST-11 35
HROST-12 17
HROST-76 30
HROST-13a 16
HROST-14 21
HROST-15 30
HROST-16 21
HROST-17 27
HROST-22 29
HROST-20 30
HROST-19 29
HROST-23 30
HROST-25 27
HROST-26 11
HROST-65
HROST-28 25
HROST-29 15
HROST-24 17
HROST-27
HROST-77
HROST-78 16
HROST-31a 27
HROST-30 17
HROST-33 11
HROST-34
HROST-36 18
HROST-35
HROST-74 18
HROST-37 16
HROST-39 19
HROST-38a 22
HROST-40 7
HROST-72 26
HROST-43 21
HROST-70 11
HROST-41
HROST-68 25
HROST-44 17
HROST-47 13
HROST-45 22 26
HROST-52 14
HROST-50
HROST-49 26
HROST-51 10
HROST-48
HROST-66 35
HROST-60
HROST-67
HROST-53
HROST-54
HROST-55
HROST-56
HROST-57
HROST-80

HMW-25
HMW-26
HMW-27
HMW-28
HMW-29

HB-31
HB-32
HB-33
HB-16
HB-30
HB-37
HB-07
HB-27 (PLUGGED)
HB-38

RW-1
RW-2
RW-3

HMW-07
HMW-08
HMW-21/22
HMW-02
HMW-01
HMW-09/10
HMW-13/14
HMW-19
HMW-18
HMW-3
HMW-4
HMW-20

IEPA-4

P-47
P-76
P-77
P-78
P-79
P-107
P-106
P-105
P-104
P-80
P-81

SP-20 SP-18 SP-19 SP-23 SP-22 SP-30 SP-33 SP-16 SP-15 SP-32 SP-28 SP-25 SP-5 SP-27 SP-35 SP-26 SP-14 SP-34 SP-1 SP-7 SP-24 SP-31 SP-17 SP-4 SP-29 SP-38 SP-28 SP-3 SP-8 SP-42 SP-43 SP-44 SP-11 SP-6 SP-9 SP-12 SP-13 SP-10

W. RAND AVE
E. RAND AVE
N. DELMAR AVENUE
W. ARBOR ST
W. BIRCH ST
E. BIRCH ST
W. CHERRY ST
E. CHERRY ST
W. DATE ST
E. DATE ST
N. MARKET STREET
W. ELM ST
E. ELM ST
W. FOREST ST
E. FOREST ST
W. WATKINS ST
E. WATKINS ST
W. MAPLE STREET
E. MAPLE STREET
E. HAWTHORNE STREET
E. 1ST STREET
S. DELMAR AVENUE
ILLINOIS STATE ROUTE 3
ILLINOIS TERMINAL RR
ALTON RAILROAD CO.
C.C.C. & STL. RR
PARKING LOT
B-74 SALES

BUFFER ZONE

LEGEND:

- CPT/ROST™ INVESTIGATION LOCATION NO APPARENT PETROLEUM HYDROCARBON (BLACK)
- CPT/ROST™ INVESTIGATION LOCATION LIGHTER-RANGE PETROLEUM HYDROCARBON (BLUE)
- CPT/ROST™ INVESTIGATION LOCATION MID-RANGE PETROLEUM HYDROCARBON (GREEN)
- CPT/ROST™ INVESTIGATION LOCATION HEAVY-RANGE PETROLEUM HYDROCARBON (YELLOW)
- EXISTING MONITORING WELL
- RECOVERY WELL
- SENTINEL MONITORING WELLS
- 15 DEPTH IN FEET TO RESIDUAL HYDROCARBON

NOTES:

1. THE FOLLOWING HROST LOCATIONS 9, 18, 21, 32, 42, 46, 58, 59, 60, 63, 64, 71, 73, AND 75 WERE NOT COMPLETED DUE TO ACCESSIBILITY OR THE FACT THAT THE LOCATION WAS NOT DEEMED NECESSARY BASED ON NEARBY RESULTS.

SCALE IN FEET
0 125 250 500

CHECK BY	KDC
DRAWN BY	BCP
DATE	6-25-04
SCALE	AS SHOWN
CAD NO.	0309507X5
PRJ NO.	15-03095

INFERRED DEPTH TO FIRST ENCOUNTERED RESIDUAL HYDROCARBON
(WORK IN PROGRESS – WILL BE UPDATED AS NEW DATA BECOMES AVAILABLE)
VILLAGE OF HARTFORD, IL

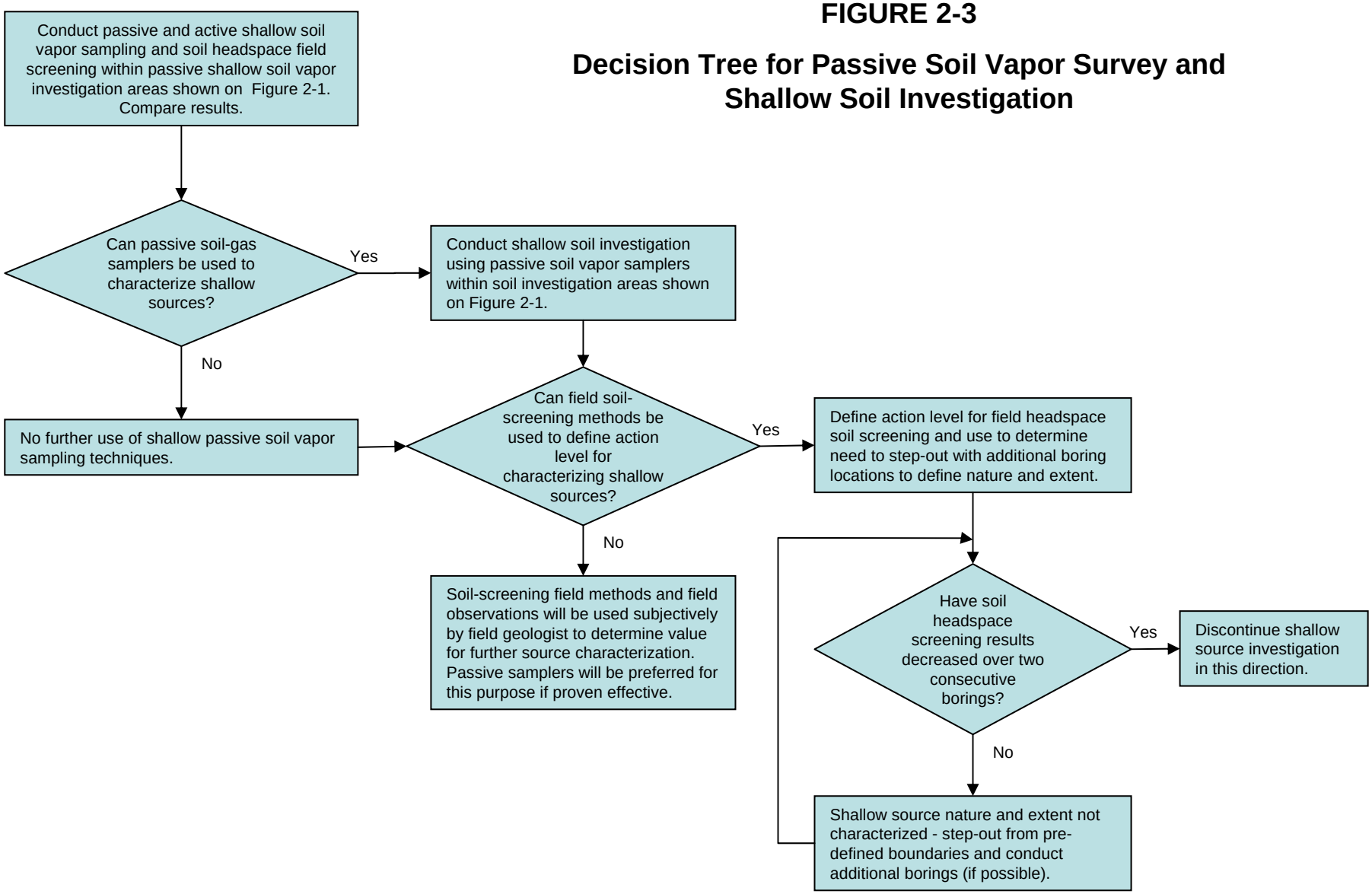
THE HARTFORD WORKING GROUP
HARTFORD, ILLINOIS

Clayton® GROUP SERVICES

FIGURE 2-2

FIGURE 2-3

Decision Tree for Passive Soil Vapor Survey and Shallow Soil Investigation



ID	Task Name	Duration	Start	Finish
1	**CSM Investigation**	**152 days**	**Fri 12/10/04**	**Tue 5/10/05**
2	**Work Plan**	**18 days**	**Fri 12/10/04**	**Mon 12/27/04**
3	Submit to Agency	0 days	Fri 12/10/04	Fri 12/10/04
4	Agency Review	18 days	Fri 12/10/04	Mon 12/27/04
5	Agency Approval	0 days	Mon 12/27/04	Mon 12/27/04
6	**VMP Installation**	**31 days**	**Wed 12/15/04**	**Fri 1/14/05**
7	Mark Borings	2 days	Wed 12/15/04	Thu 12/16/04
8	Utility Clearance (1st Area)	2 days	Mon 12/20/04	Tue 12/21/04
9	Install VMPs	19 days	Mon 12/27/04	Fri 1/14/05
10	**SV/IA Sampling**	**55 days**	**Tue 12/28/04**	**Sun 2/20/05**
11	Setup IA Sampling Appts.	11 days	Tue 12/28/04	Fri 1/7/05
12	Existing VMPs & MPs	7 days	Mon 1/10/05	Sun 1/16/05
13	Indoor Air Sampling	14 days	Mon 1/10/05	Sun 1/23/05
14	New VMPs	7 days	Mon 1/17/05	Sun 1/23/05
15	Sample Analyses	40 days	Wed 1/12/05	Sun 2/20/05
16	**Passive Soil Vapor Investigation**	**31 days**	**Mon 1/3/05**	**Wed 2/2/05**
17	Install Samplers in Area 1	3 days	Mon 1/3/05	Wed 1/5/05
18	Install Samplers in Area 2	2 days	Thu 1/6/05	Fri 1/7/05
19	Retrieve Samplers	2 days	Sat 1/15/05	Sun 1/16/05
20	Sampler Analysis	14 days	Mon 1/17/05	Sun 1/30/05
21	Assess Use for Shallow Soil Inv.	3 days	Mon 1/31/05	Wed 2/2/05
22	**Shallow Soil Investigation**	**47 days**	**Thu 2/3/05**	**Mon 3/21/05**
23	Investigate/Install Samplers Areas 3, 4, 5, 6, 7	14 days	Thu 2/3/05	Wed 2/16/05
24	Retrieve Samplers	11 days	Fri 2/25/05	Mon 3/7/05
25	Sampler Analysis	14 days	Tue 3/8/05	Mon 3/21/05
26	**Sewer Sampling**	**42 days**	**Mon 1/3/05**	**Sun 2/13/05**
27	Round 1	14 days	Mon 1/3/05	Sun 1/16/05
28	Round 2	14 days	Mon 1/17/05	Sun 1/30/05
29	Round 3 (etc. thru April 2005)	14 days	Mon 1/31/05	Sun 2/13/05
30	**Report**	**107 days**	**Mon 1/24/05**	**Tue 5/10/05**
31	Prepare Draft Report	90 days	Mon 1/24/05	Sat 4/23/05
32	Submit Draft to HWG	0 days	Sat 4/23/05	Sat 4/23/05
33	HWG Review	10 days	Sun 4/24/05	Tue 5/3/05
34	Finalize	7 days	Wed 5/4/05	Tue 5/10/05
35	Submit to Agency	0 days	Tue 5/10/05	Tue 5/10/05
36	**Monitoring Program**	**287 days**	**Mon 1/10/05**	**Sun 10/23/05**
37	**Quarterly Monitoring**	**287 days**	**Mon 1/10/05**	**Sun 10/23/05**
38	1st Quarter (Completed above)	14 days	Mon 1/10/05	Sun 1/23/05
39	2nd Quarter	14 days	Mon 4/11/05	Sun 4/24/05
40	3rd Quarter	14 days	Mon 7/11/05	Sun 7/24/05
41	4th Quarter	14 days	Mon 10/10/05	Sun 10/23/05
42	**Monthly Monitoring**	**99 days**	**Thu 3/10/05**	**Thu 6/16/05**
43	1st Month	7 days	Thu 3/10/05	Wed 3/16/05
44	2nd Month	7 days	Sun 4/10/05	Sat 4/16/05
45	3rd Month	7 days	Tue 5/10/05	Mon 5/16/05
46	4th Month	7 days	Fri 6/10/05	Thu 6/16/05

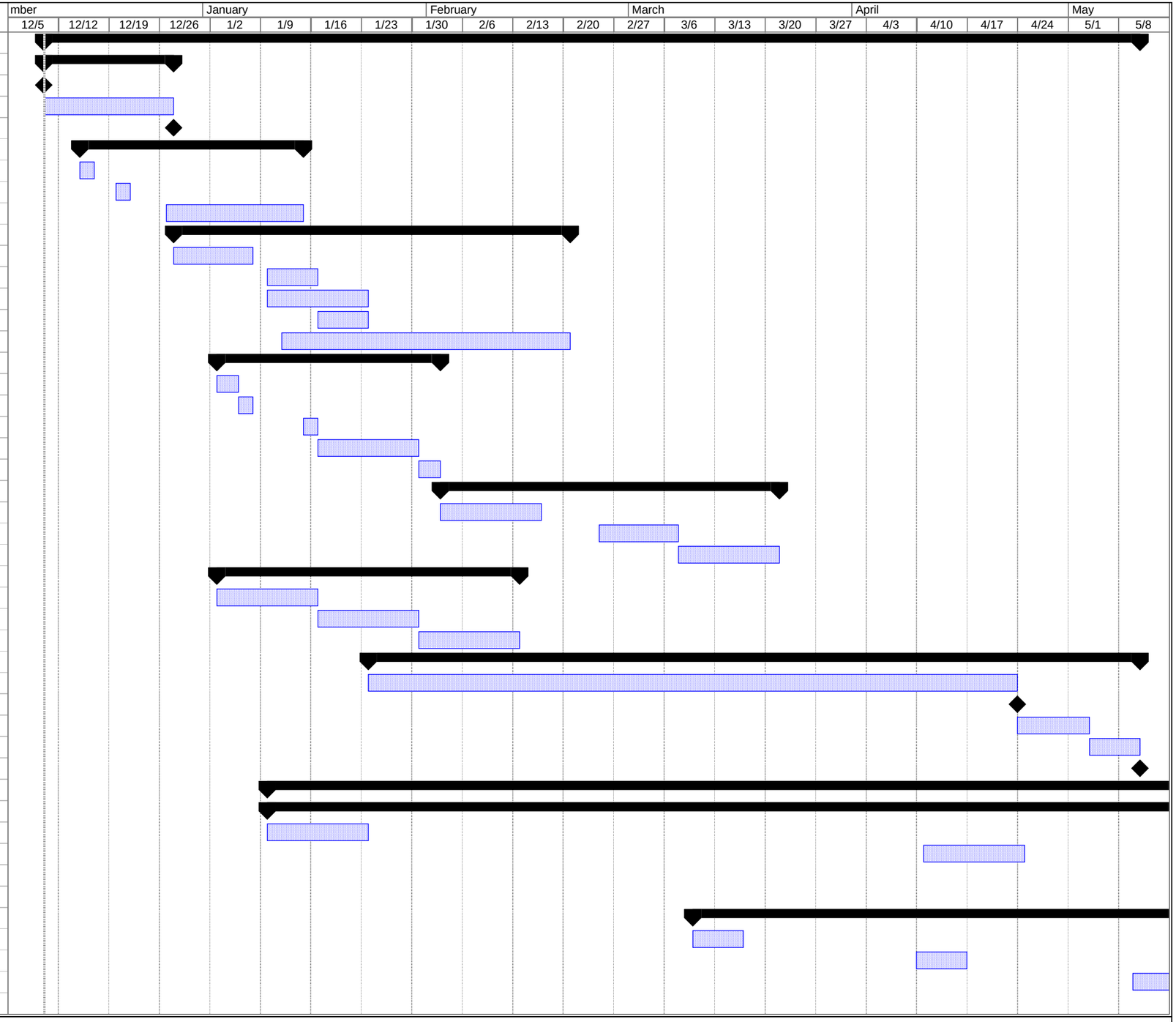


Figure 3-1
Project: CSM Investigation
Date: Fri 12/10/04

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary

DRAFT - Work in Progress